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TRUTHLIKENESS AND THE CORRESPONDENCE THEORY OF TRUTH

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1. *Interlevel and intralevel interpretations of correspondence*

For the empirical sciences it is plausible to distinguish one concrete level and two abstract levels. *Level C* is the level of the material world consisting of systems and states of affairs. On abstract *level I* we put settheoretic structures; they are used to represent parts or aspects of level C. Finally, on *level II* we localize the sentences of formal languages; they can be used to formalize level I, and they can be interpreted on level I.

Whatever 'truth' is, it is clear that 'correspondence' in 'the correspondence theory of truth' may be an *inter*level or an *intra*level affair. Moreover, it can be conceded that at first sight an interlevel interpretation of 'correspondence' seems the most plausible and it is well known that Tarski's so-called semantic definition of truth (SDT) is frequently claimed to explicate such an interlevel conception (between II and I or C).

In its modern form SDT is based on the notion of a model of a formal language. Leaving technical details aside, a model M for language L associates with each sentence s of L a statement s^M about the structure generated by M. Now, SDT is a recursive procedure, using assignments that do or do not satisfy atomic and complex formulas, such that s gets the truth-value TRUE in M if and only if (it is true that) s^M, i.e. iff the associated or corresponding statement (interpreted sentence) is true. Hence, SDT defines a formal truth value for sentences *relative* to a model in terms of an *absolute*, albeit non-formal, truth value of statements about the structure generated by the model. Moreover, it is clear that SDT is an interlevel matter, at least in its modern form[1] between I and II.

Tarski claimed first of all that SDT explicates Aristotle's dictum: "To say of what is that it is not, or of what is not that it is, is false, while to say of what is that it is, or of what is not that it is not, is true", or in terms of a famous instance of Tarski's material condition of adequacy: "The sentence 'snow is white' is true if, and only if, snow is white". This condition will here be called *the condition of coordination*. The claim that SDT realizes this condition has never been seriously disputed, and it will be clear from our description of SDT that we can easily concede this point, although of course only as far as coordination between II and I is concerned.

For us it is more important that Tarski, though hesitatingly, and later Carnap, Stegmüller and Popper, without hesitation, claimed that SDT provides in addition an (interlevel) explication of the idea of a correspondence theory of truth. This claim has however been seriously disputed (for surveys of criticisms see e.g. O'Connor (1975, 112–136) and Puntel (1978, 62–69). Here we shall evaluate this claim in terms of what we consider to be the two basic *correspondence intuitions*:

(i) "A is true (false)" iff
"A corresponds (does not correspond) to 'the facts'"
(ii) "B is closer to the truth than A" iff
"B corresponds better to 'the facts' than A"

Assuming that A and B are sentences on level II and that 'the facts' are localized on level I or level C, it is clear that SDT does not explicate intuition (ii), at least we do not see any point

of contact, let alone indication, in the direction of (ii). If we accept this, the fact that SDT may seem to explicate intuition (i) may well be due to the fact that it explicates and satisfies the coordination condition. These considerations equally apply to the original version of SDT (see note 1).

One might object to this evaluation that the interlevel correspondence claim associated with SDT has to be restricted to atomic sentences, as the 'snow is white'-example, used as an instance of correspondence, may suggest. However, in this way the correspondence claim is not only reduced, but the nature of the correspondence is even more left in the dark.

The natural question now is of course whether there are other candidates for an interlevel correspondence theory of truth, explicating at least intuitions (i) and (ii). If there would be a fully elaborated picture theory of truth (between level II and I or C, or even between I and C), this would be a plausible candidate. However, neither Wittgenstein's formulation of it, nor probably its most modern version, due to Oddie (1987), are easy to understand, let alone to evaluate with respect to our question. Moreover, it seems that Oddie's explication of Wittgenstein's picture theory is, surprisingly enough, essentially intralevel. Hence, let us turn to possible intralevel explications of (i) and (ii).

Verisimilitude or truthlikeness theories (TL-theories) are primarily designed to explicate the expression "A is closer to the truth T than B" in an intralevel way, i.e. A, B and T are assumed to be of the same level, I or II. TL-theories usually have also a plausible definition of "A is true(false)" in terms of T. Hence, it is clear that TL-theories can at the same time be conceived as explications of the correspondence intuitions (i) and (ii) *as soon as one is prepared to localize 'the facts' at the same level as A and B*, of course by identifying them with 'the truth'. This brings us to the main claims of this paper.

Claim 1: The correspondence intuitions have to be interpreted in an *intra*level way, and TL-theories explicate them in principle.

Claim 2: *Inter*level interpretation of the correspondence intuitions is a tempting misinterpretation and an easy confusion due to the undeniable distinguishability of levels.

Notably Popper fell explicitly a victim of this confusion. Being a champion of an interlevel interpretation, he nevertheless presented his famous (defective) intralevel definition of 'closer to the truth' also as a definition of 'better correspondence to the facts' (Popper (1963), 233).

Unfortunately, there are at the moment quite a number of TL-theories. The following classification is supposed to be more or less self-explaining:

Level-II or syntactic theories
- based on consequences: Popper (1963), Newton–Smith, Schurz/Weingartner
- based on similarities: Tichý, Oddie, Hilpinen, Niiniluoto (partly)

Level-I or structuralist theories (based on similarities between (sets of) structures)
- conceiving the truth as one structure: Miller, Niiniluoto (partly)
- distinguishing descriptive and theoretical truth: Kuipers.

In Kuipers (1987) almost all these approaches are presented and further documented by their respective defenders. Despite the variety of theories, the last claim of this section will not come as a surprise.

Claim 3: Of all intralevels interpretations of the correspondence intuitions, at least as far as TL-theories are concerned, my own theory, to be called the *stratified* (structuralist) *TL-theory*, is the most adequate. In particular, its naive, comparative (descriptive and theoretical) versions show in detail how false descriptions and theories lack (full) 'correspondence to the facts' and how 'being closer to the truth' increases 'correspondence to the facts'.

The specific part of this claim will be illustrated in the next section.

2. *The stratified truthlikeness theory as correspondence theory of truth*

We start with the paradigm example of the stratified theory: an electric circuit:

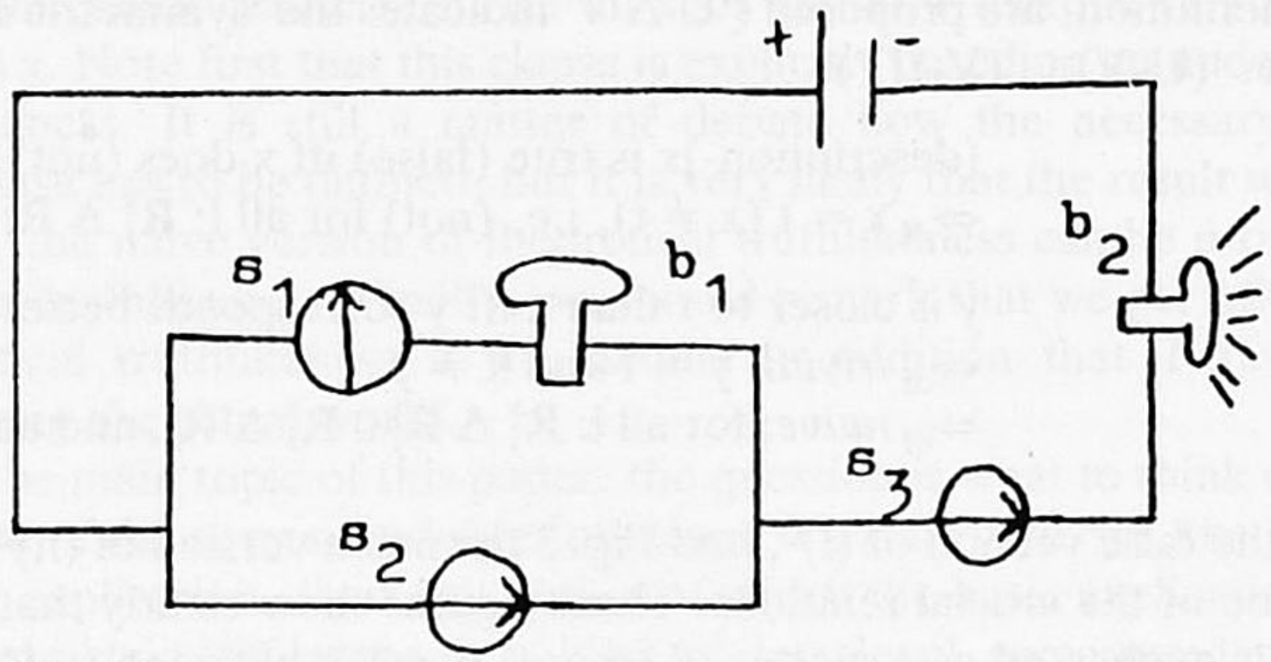
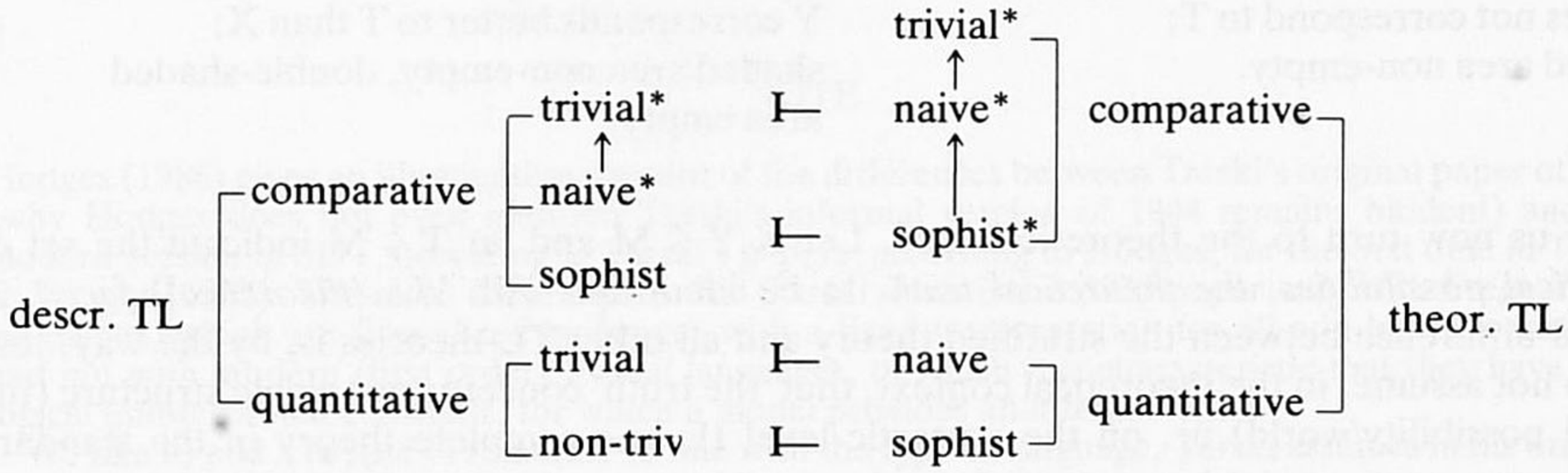


Fig. 1

structures:	$\langle S, B, C, L \rangle$
switches:	$D = \{s_1, s_2, s_3\}$
bulbs:	$B = \{b_1, b_2\}$
connected switches:	$C \subseteq S$
lighting bulbs:	$L \subseteq B$

Descriptive truthlikeness: let t indicate the structure representing the actual state of the circuit (hence, according to Fig. 1: $C = \{s_2, s_3\}$, $L = \{b_2\}$): the true description (representation) or *the descriptive truth*. Main TL-question: how to define "structure (description) y is closer to t than x"? *Theoretical truthlikeness*: let T indicate the set of structures representing the empirically possible states of the circuit (hence, roughly: a bulb lights iff it is in a connected path): the true theory or *the theoretical truth*. Main TL-question: how to define "the set of structures (theory) Y is closer to T than X"? It will be plausible that theoretical TL has to be based, at least implicitly, on descriptive TL.

The following scheme gives a survey of the bifurcations of the stratified theory as exposed in Kuipers (1982) and (1987b). We neglect the bifurcation with a relative distinction between observational and theoretical structures, exposed in Kuipers (1987c). Signs and abbreviations: ⊢ : is basis for; → : implies; * : see below; sophist: sophisticated.



In order to support *Claim 3* we can confine ourselves to the trivial and naive, comparative notions and we will directly include the relevant correspondence formulations. Fig. 2 and 3 illustrate the descriptive as well as the theoretical story. We start with descriptive truthlikeness, which will here only be defined for a fixed domain. In fact it is the model-theoretic or structuralist extrapolation of the definition given in Kuipers (1982) for propositional structures.

Let M indicate the set of conceptually possible structures, *the conceptual possibilities*, of a type $\langle D, R_1, \ldots, R_n \rangle$ appropriate for the context, with fixed domain (or union of domains) D and relations $R_1, \ldots, R_n$ defined on it. Let $x, y \in M$ and let $t \in M$ indicate the actual possibility, *the descriptive truth*, to be identified with '*the (descriptive) facts*'. The following explications, by definition, are proposed ('U Δ V' indicates the 'symmetric difference between sets U and V', i.e. '(U-V) ∪ (V-U)'):

(i)^d (description-)x is true (false) iff x does (not) correspond to t
$\Leftrightarrow_{df} x = t$ ($x \neq t$), i.e. (not) for all i: $R_i^x \Delta R_i^t = \emptyset$

(ii)^d y is closer to t than x iff y corresponds better to t than x
$\Leftrightarrow_{df}$ *trivial*: $y = t$ and $x \neq y$
$\Leftrightarrow_{df}$ *naive*: for all i: $R_i^y \Delta R_i^t \subseteq R_i^x \Delta R_i^t$, and at least once proper.

Fig. 2 illustrates the false version of (i)^d, and Fig. 3 the naive version of (ii)^d, assuming in both cases that R_j is one of the crucial relations. These figures show clearly that and how '(better) correspondence' is explicated as a matter of (more) overlap between (relational) sets. (That the areas have equal form and size has no particular relevance.)

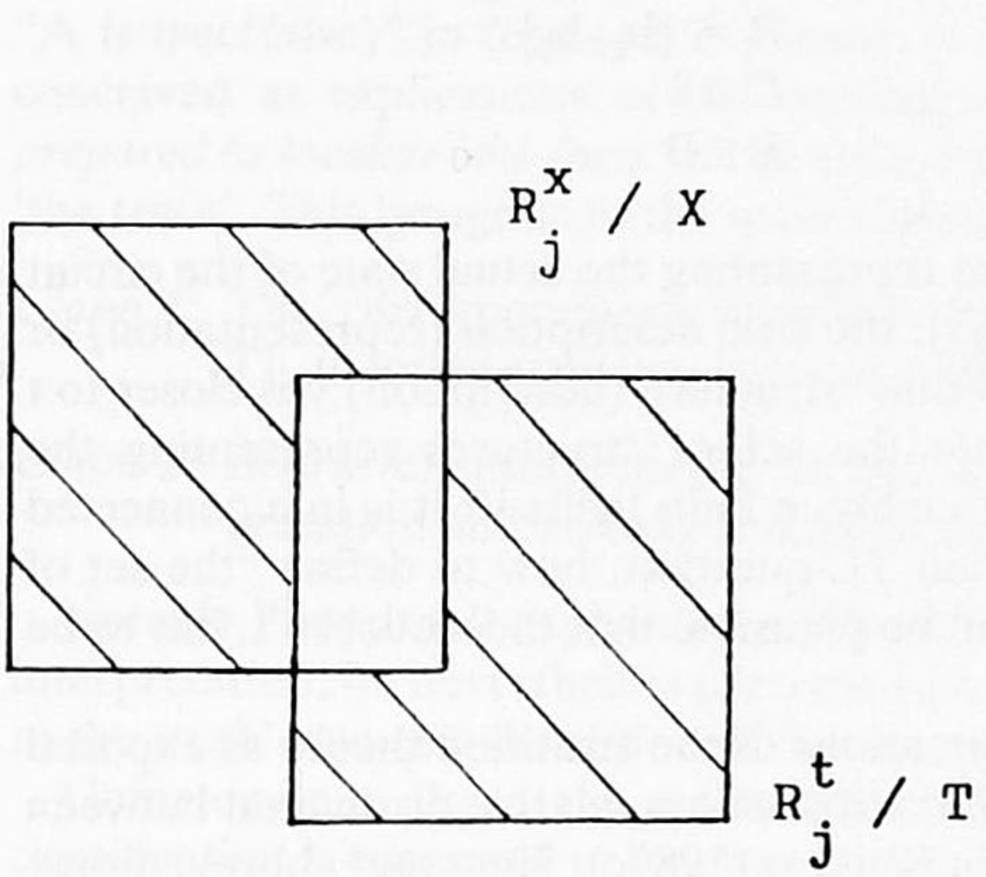


Fig. 2: x does not correspond to t (assuming that R_j is crucial), respectively, X does not correspond to T; shaded area non-empty.

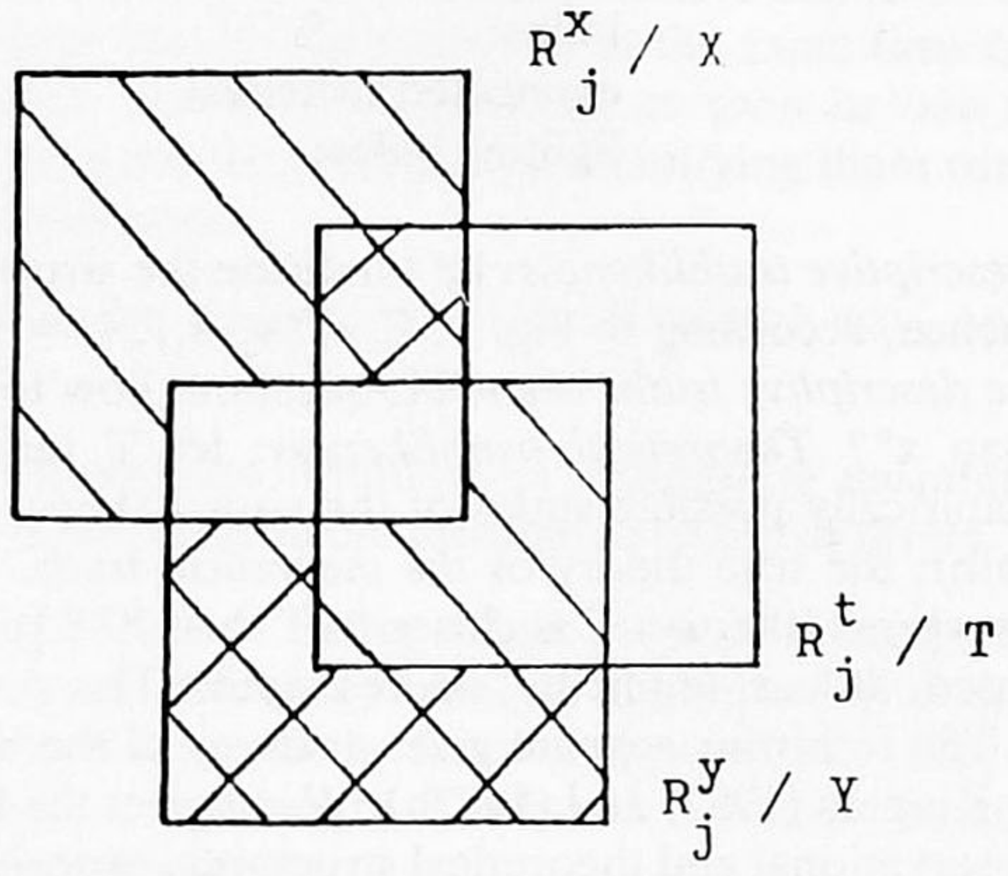


Fig. 3: y corresponds better to t than x (assuming that R_j is crucial), respectively, Y corresponds better to T than X; shaded area non-empty, double-shaded area empty.

Let us now turn to the theoretical case. Let $X, Y \subseteq M$ and let $T \subseteq M$ indicate the set of *empirical possibilities*, *the theoretical truth*, to be identified with '*the (theoretical) facts*'. A crucial difference between the stratified theory and all other TL-theories is, by the way, that we do not assume, in the theoretical context, that 'the truth' concerns one single structure (the actual possibility/world) or, on the syntactic level II, one complete theory in the standard sense.

The explications are similar to the descriptive ones:

(i)^t (theory-)X is true (false) iff X does (not) correspond to T
$\Leftrightarrow_{df} X = T$ ($X \neq T$), i.e. $X \Delta T = \emptyset$ ($X \Delta T \neq \emptyset$)

(ii)^t Y is closer to T than X iff Y corresponds better to T than X
$\Leftrightarrow_{df}$ *trivial*: $Y = T$ and $X \neq Y$
$\Leftrightarrow_{df}$ *naive*: $Y \Delta T \subset X \Delta T$ (proper inclusion!)

Note that Fig. 2 also illustrates the false version of (i)^t, and Fig. 3 the naive version of (ii)^t, again showing that '(better) correspondence' is a matter of (more) overlap of sets, now of sets of structures.

We only want to give an impression of the sophisticated version of "Y is as close to T as X", by stating the unproblematic clause of it: for all $x \in X$ and $z \in T$ there is $y \in Y$ such that y is at least as close to z as x. Note first that this clause is explicitly based on an underlying notion of descriptive truthlikeness. It is still a matter of debate how the necessary, more or less complementary, clause has to be defined, but it is very likely that the result will be such that, when looking back, the naive version of theoretical truthlikeness can be proved to be based on trivial descriptive truthlikeness. Finally, we should remark that we get Miller's TL-theory from naive theoretical truthlikeness if we assume in addition that T just contains one structure, representing the actual world.

Coming back to the main topic of this paper, the question is what to think of the presented intralevel explication of the correspondence intuitions. To start with, we like to concede that, if it is a satisfactory explication, then any notion of which the basic explication is in terms of the settheoretic symmetric difference is a kind of intralevel correspondence notion. But should the general nature of an explication be an objection?

The main objection seems to be this. The explication is question-begging for it presupposes the statements "t is the true description/representation" and "T is the true theory", and the *inter*level correspondence (possibly pictorial) is hidden in them. However, our tentative answer is that the meaning of these statements is only this: t and T are the (hypothetical) results of faultless application of the relevant representation conventions. Of course, if one wishes to formalize, and hence to work with two abstract levels it is desirable to have the representations on both levels such that they mutually satisfy the coordination condition, i.e. Tarski's material condition of adequacy or Aristotle's dictum. But this coordination is only a matter of easy convention, as opposed to claims of (lack of) intralevel correspondence and better correspondence. Such claims form the substantial part of the empirical sciences, where 'the facts' or, *equivalently*, 'the truth' form(s) the great unknown.

At least for the natural sciences we would like to defend this, for in the social sciences it is doubtful whether it makes sense to talk about 'the facts/the truth', in particular the theoretical ones, even if we fix the conceptual means beforehand, as was presupposed throughout this paper.

NOTE

[1] Hodges (1986) gives an illuminating account of the differences between Tarski's original paper of 1935 (why Hodges does not even mention Tarski's informal version of 1944 remains hidden!) and the modern version of SDT, occurring in Tarski's papers, according to Hodges, for the first time in Tarski & Vaught (1957). The main difference is that Tarski deals in his 1935-paper only with Frege-Peano languages, which are *formalized* languages with a fixed interpretation for all non-logical constants, and not with modern (first order) *formal* languages, of which it is characteristic that they have non-logical uninterpreted constants, for which a model provides an interpretation.

We like to add a couple of remarks. In line with the type of language, Tarski assumes in his original papers a context where there is only *one world* or, more carefully, one model or structure representing that world, described by the formalized language, of which every sentence gets a definite truth value. This is indeed quite different from the present-day flexible, and very fruitful, use of SDT for formal languages or, in Hodges' terms, "truth in a structure" is one of the few important scientific inventions of an *indexical* notion.

It is surprising that Hodges does not pay attention to the fact that, although Tarski suggests in the informal parts of both papers to deal not only with (pure) mathematics, but also with (formalizable) empirical sciences, he only gives the definition in full detail for 'the language of the calculus of classes' (with a fixed interpretation for 'inclusion'!), where the one target-world is the abstract, or at least

non-material, universe of classes. Having this mathematical paradigm in his mind, might well explain why Tarski does not make the distinction corresponding to our distinction between concrete level C and abstract level I. This may be defensible, even unavoidable, for (pure) mathematics, it is certainly an avoidable confusion for empirical sciences.

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